

## Question2

***Solution :***

First, we can choose a bolt randomly and try to compare with every nuts with it so we can get 3 kinds of nuts, too large, too small, or matching to the chosen one.

Then we use the matching nuts try to compare with every bolt, we can get 3 kinds of bolts, too large, too small, or match.

Now, we have 2 groups of nuts with bolts, too large or too small to the chosen nut or bolt, we can randomly choose one nut in each group and repeat the comparing in each group until the number of nut and bolt in each group is only one.

***Proof:***

This solution is a quick sort but process alternately so the expected time should be  $O(n \log n)$ .